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Effect of Micro-gas Inclusions on Abnormally Delayed Mechanical Behaviour of Intact Rocks after Excavation

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In-situ intact rocks can have an abnormally delayed behaviour that can occur after engineering excavation or tunnelling. Such behaviour normally and suddenly occurs in parts of the surrounding rocks at many minutes, hours, days, and months after the completion of excavation or tunnelling. Most importantly, intact rocks contain numerous small or tiny connected or isolated voids and pores with gas inclusions. Based on the fact of fluid (gas) inclusions, Yue (2012, 2014, 2015) proposed a hypothesis of originality that the abnormally delayed behaviour of intact rocks after excavation is caused by their micro-gas inclusions of high pressure.

In order to investigate and validate the hypothesis, a laboratory setup is developed to fabricate the rock-like solids with high pressure gas inclusions, as shown in Figure 1. Thus, the rock-like material can be lithified and formed at high compressive stress conditions. During the lithification process, the gas can be compressed and confined in the solid. Some initial results are presented here.

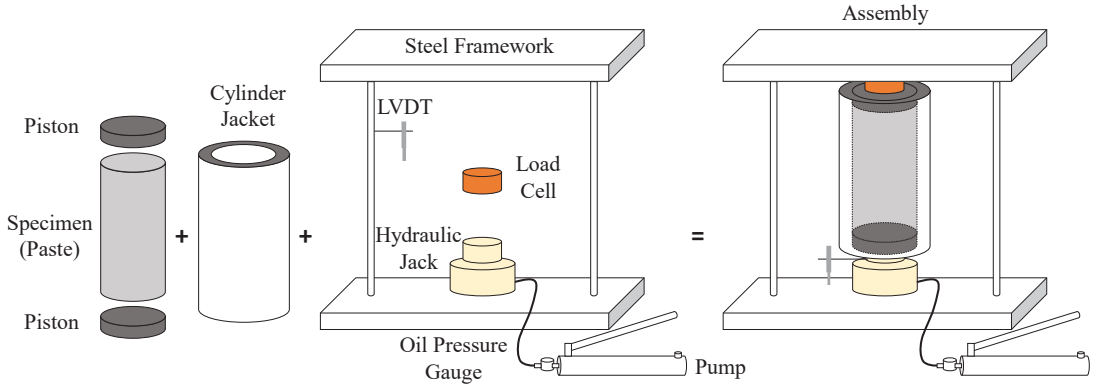

Figure 1. Schematic of experimental setup for rock-like material fabrication.

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